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# **Joint Engineering Change Management Model (JECMM) DII Project**

**1 November 2000**

# Purpose

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- **Provide overview of JECMM project**
- **Discuss selected PDM tools and DoD-related capabilities**
  - PDM tools selected based on usage at a participating JECMM Government location

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# **JECMM Project Overview**

# Outline

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- **JECMM Business Case**
- **Standards, not Standardization**
- **How and Where Product Data Mark-up Language Works**
- **JECMM Scope**
  - Process and Architecture Views
- **Project Schedule**
- **Project Implementation Plan Outline Work Breakdown Structure**

# What's the JECMM Business Case?

## ...For Manufacturing Firms and beyond

- Commercial Market motivations include reducing Time-to-Market & reducing cost of “productization” (from idea to consumer)

### A commercial view of product life cycle:



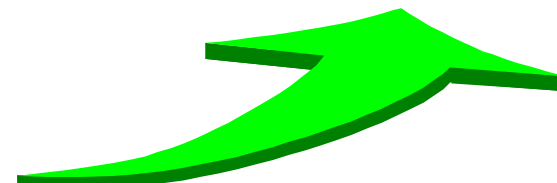
Engineering Productivity  $\approx$  25% Design

75%

Management



Researching & Designing Products | Looking for, managing, and exchanging files



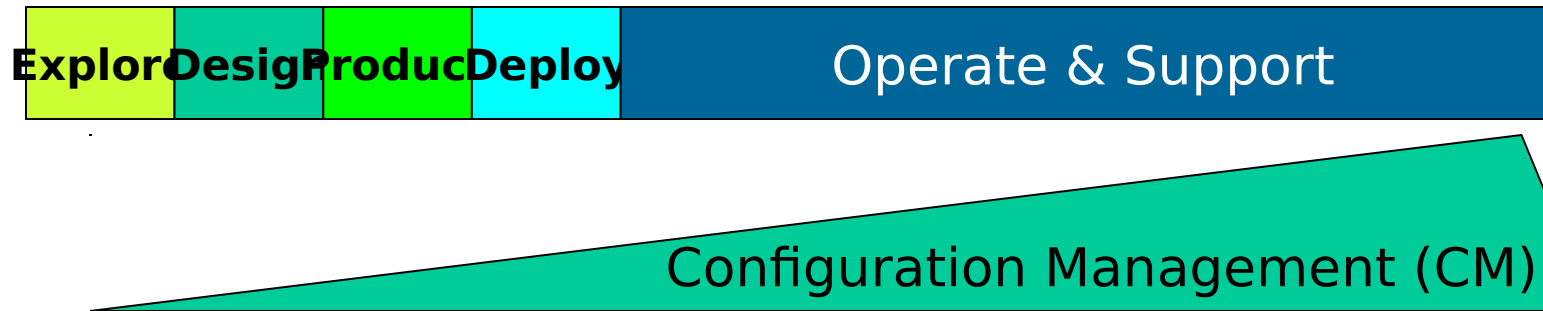
***Larger potential for improvement***

- Can further increase productivity by *integrating* product users and “sustainers” with engineers in an end-to-end ECM process

**Objective:** Increase productivity by reducing the time and effort required to find, manage, and exchange product information

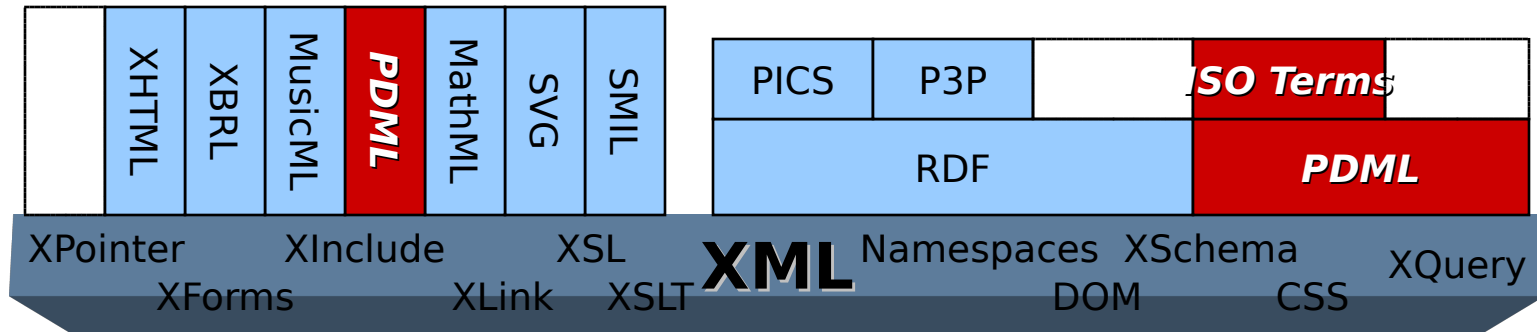
# Standards, not Standardization

## Automating Exchange of CM Information



- **CM challenge increases over the product life cycle**
  - The number of configurations to be managed typically increases during O&S
    - As-Designed, As-Built, As-Delivered, As-Maintained
  - Engineering change management (ECM) process directly addresses the O&S CM challenge and is applicable to entire product life cycle
- **For Joint products (weapon systems and other systems) need for open, standard approach to automating exchange of life-cycle CM information**
  - Based on DoD/Industry standard process (e.g., MIL-STD-2549A, EIA 649, ISO 10303)
  - Process model and template format/schema is open and exportable (e.g., UML, XML)
  - Standard/common interfaces to Warfighter/User, “sustainers”, and industry allow for rapid, electronic exchange of multimedia product information
  - Leverage previous work done for ECM interoperability (e.g, MEARS, JATDI, PDML)

# How PDML Works



- **PDML is an Enhanced XML Vocabulary**
  - Based on international standards for the exchange of product data
  - Supports complex information relationships and transformation requirements using:
    - Generalized integration schema
    - Mapping technology that supports data integration and transformation
    - Application Transaction Sets (ATS) that define user “views” or contexts

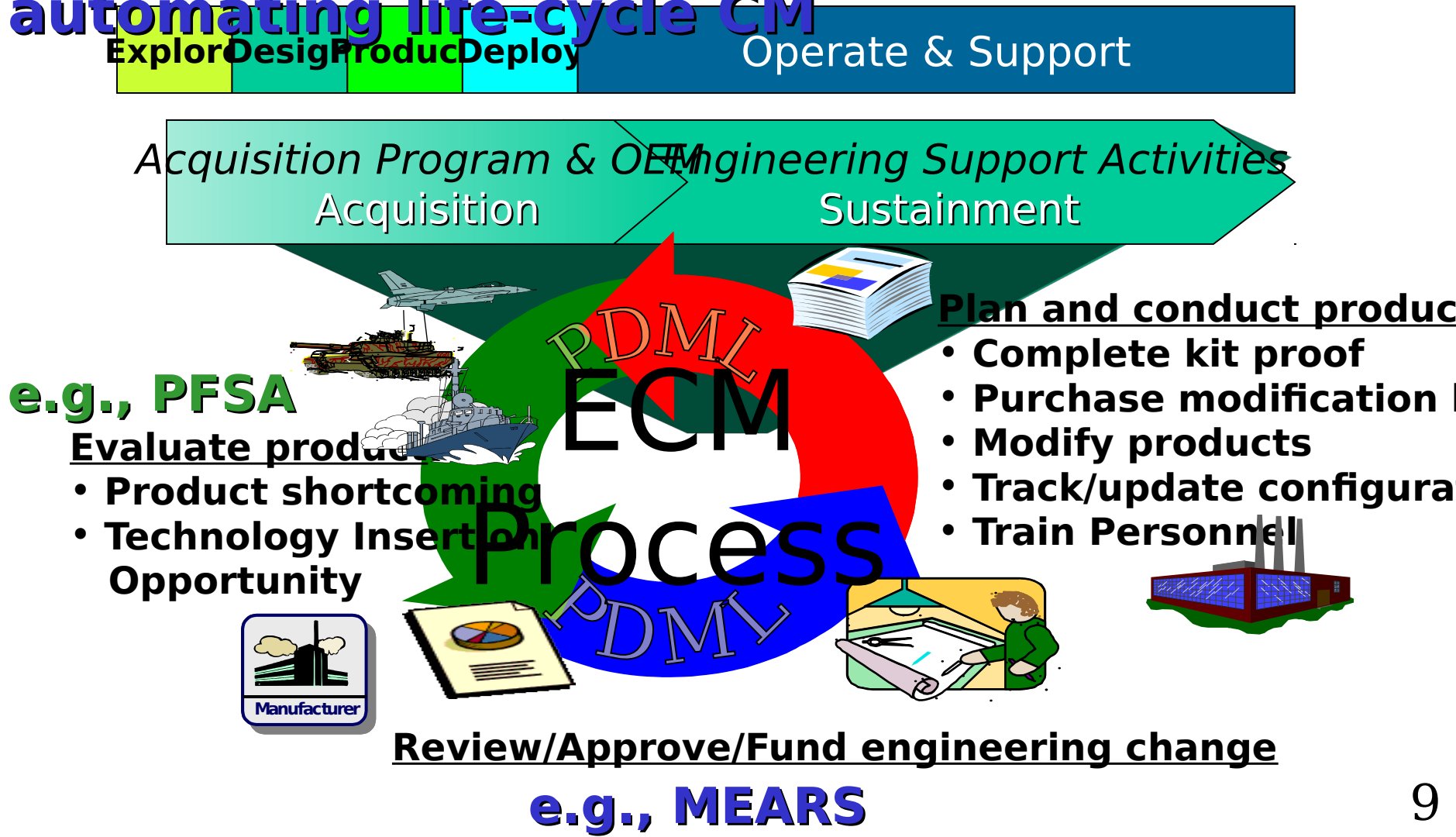
# Where PDML Works Well

- **Openness and ease of use of PDML makes it a powerful enabler to streamline DoD processes**
  - Leverages relatively inexpensive WWW infrastructure
  - Enables WWW resources to become integrated
    - Defines relationship or structure (using the integration schema) to map information and processes between each community
    - Allows each user “view” to remain unchanged with its context communicated to recipients
    - Creates an integrated information sharing environment among participants
- **PDML offers the capability to seamlessly exchange product-related data between the logistics community and other DoD communities as well as industry**
  - End-to-end logistics processes not confined to the logistics community ... includes engineering, acquisition, medical, personnel, procurement and finance communities among others



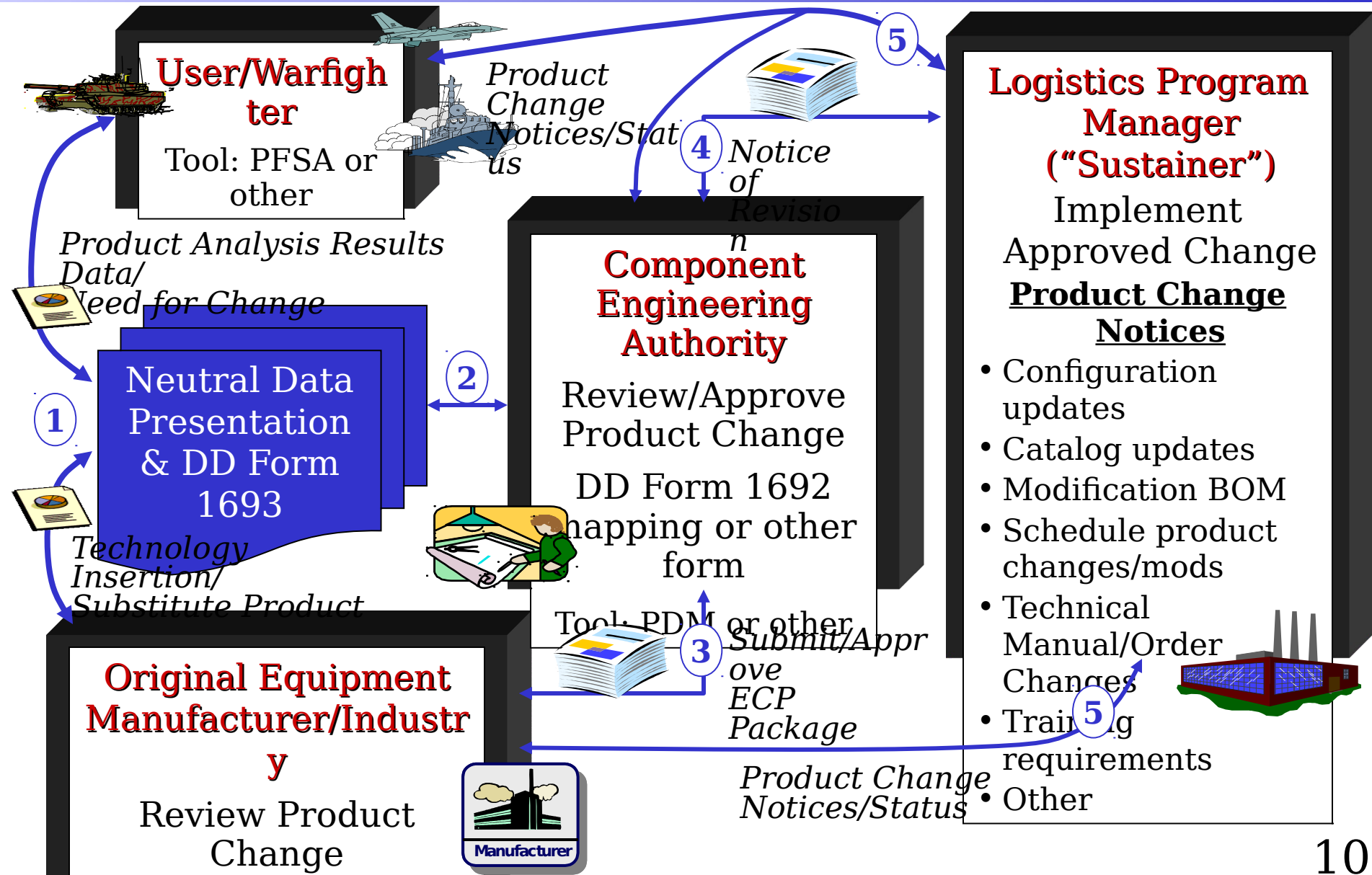
# JECMM Pilot Project Approach

## Need for open, standard approach to automating life-cycle CM



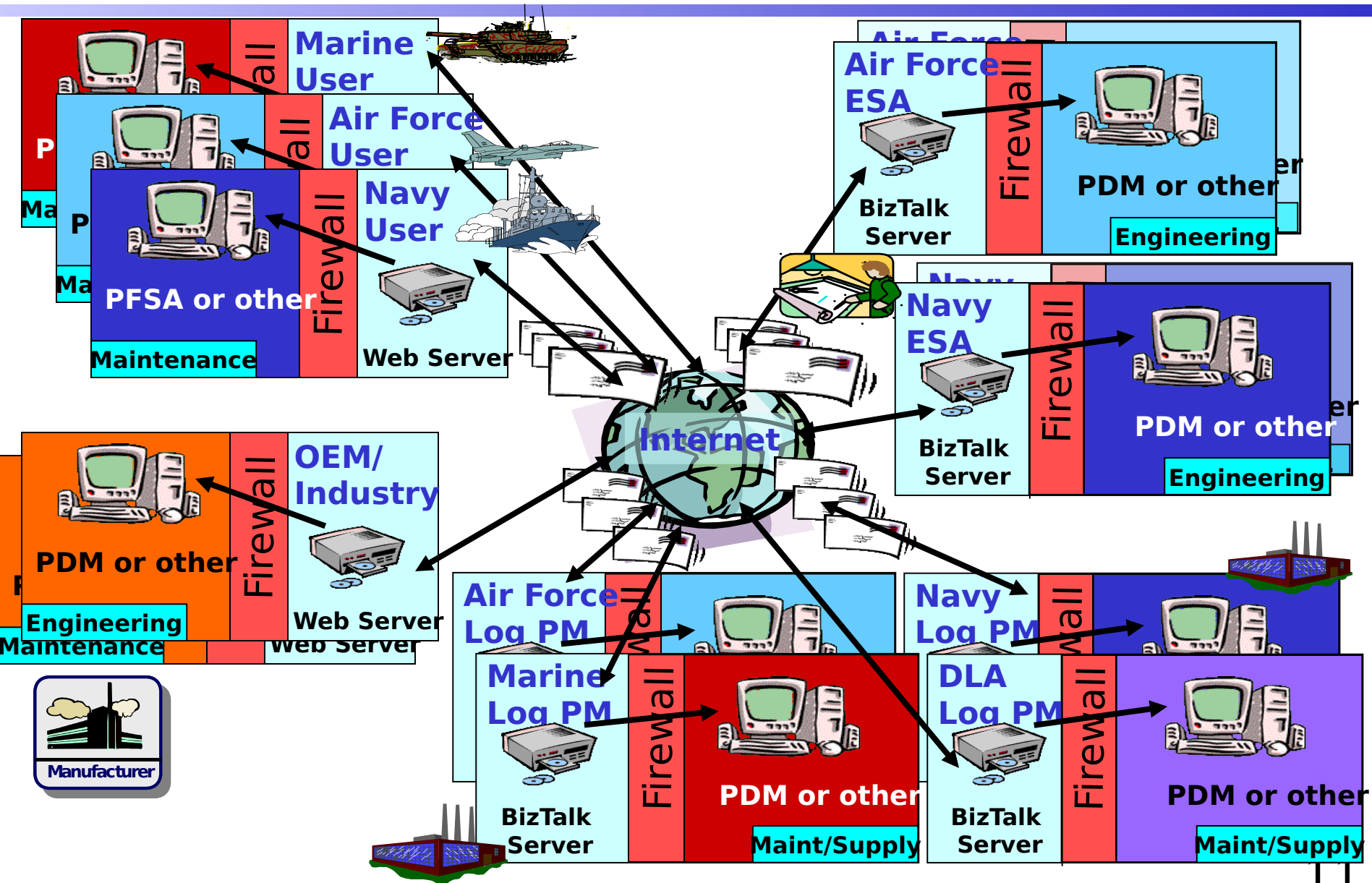
# JECMM Scope

## Process View

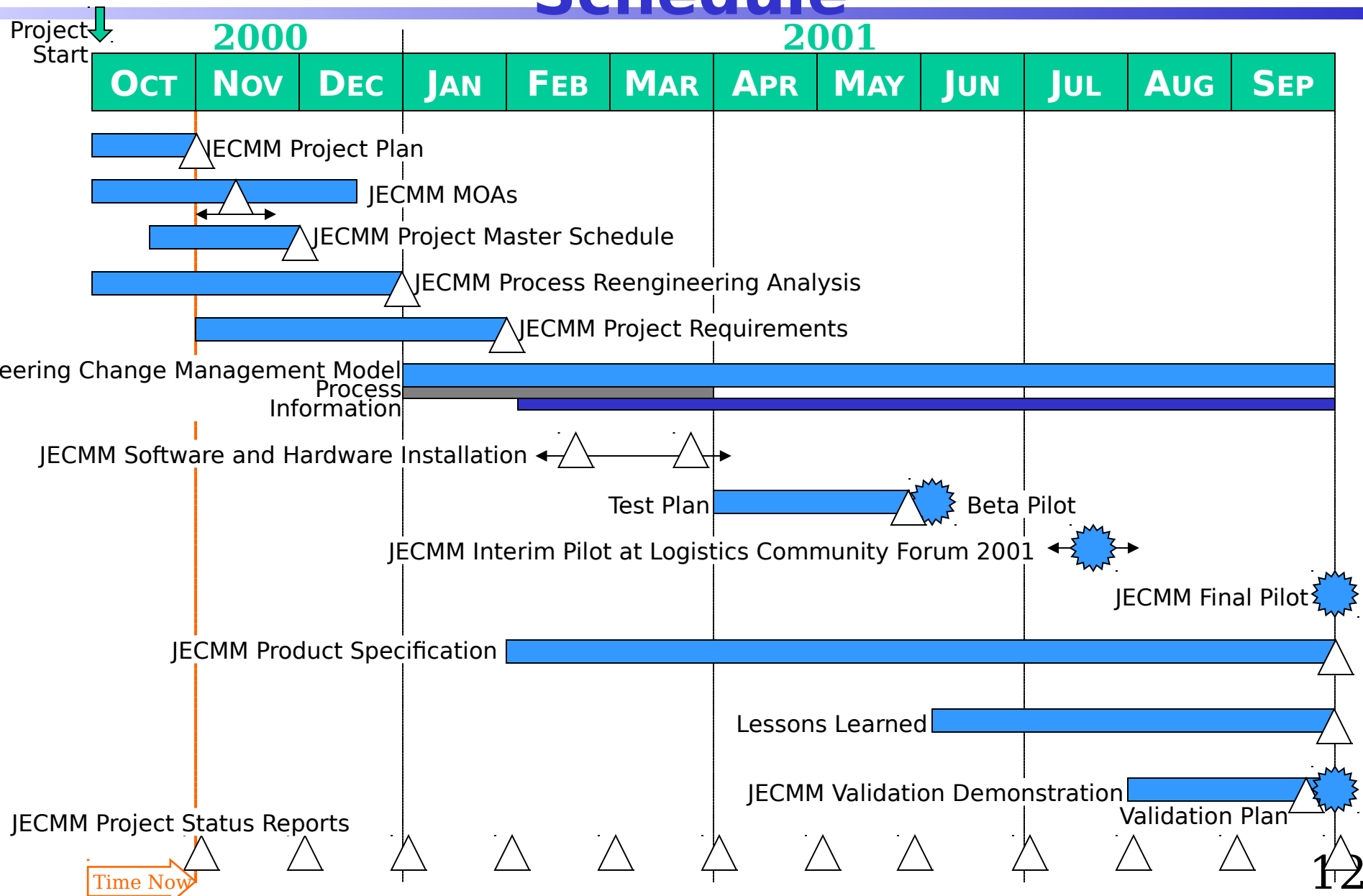


# JECMM Scope

## Architecture View



# High-level JECMM Project Schedule



# JECMM Project Implementation Plan

## Work Breakdown Structure

### JECMM

#### 1.0 Integration & Project Management

- 1.1 Develop Implementation Plan
- 1.2 Document Memoranda of Agreement
- 1.3 Develop and Manage Project Master Schedule

#### 2.0 JECMM Development

- 2.1 Conduct JECMM Process Reengineering Analysis
- 2.2 Develop and Document JECMM Requirements
- 2.3 Develop JECMM
- 2.4 Develop Data Interoperability Templates

#### 3.0 JECMM Demonstration and Documentation

- 3.1 Plan and Document JECMM Pilot Demonstration
- 3.2 Document JECMM and Pilot Demonstration in Product Specification
- 3.3 Document Project Lessons Learned

#### 4.0 JECMM Validation Demonstration

- 4.1 Plan and Document JECMM Validation Demonstration

# Back ups

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# WBS 1.0 Integration and Project Mgmt

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## **1.1 Develop Implementation Plan**

1.1.1 Develop high-level project schedule

1.1.2 Document Implementation Plan

## **1.2 Document Memoranda of Agreement**

1.2.1 Draft MOA template

1.2.2 Support JECMM IPT members in negotiating and documenting agreements

## **1.3 Develop and Manage Project Master Schedule**

1.3.1 Document sub-contractor agreements

1.3.2 Develop resource estimates

1.3.3 Develop hardware and software estimates

1.3.4 Publish master schedule on LCM web site

# WBS 2.0 JECMM Development (1 of 3)

## **2.1 Conduct JECMM Process Reengineering Analysis**

- 2.1.1 Assemble and review existing, relevant ECM modeling
- 2.1.2 Draft JECMM initial scope
- 2.1.3 Develop and distribute site survey questionnaire(s)
- 2.1.4 Conduct fact-finding site surveys, as required
  - 2.1.4.1 Document and map site-unique processes for model
  - 2.1.4.2 Assess site hardware, software, and installation requirements
- 2.1.5 Analyze findings and document in process reengineering report

## **2.2 Develop and Document JECMM Requirements**

- 2.2.1 Facilitate model requirements from initial scope
  - 2.2.1.1 Define specific users and process flow
  - 2.2.1.2 Define inputs and outputs of “Black Boxes”
  - 2.2.1.3 Define measurement criteria and parameters
- 2.2.2 Document model requirements in report



# WBS 2.0 JECMM Development (2 of 3)

## 2.3 Develop JECMM

- 2.3.1 Procure model development hardware and software
- 2.3.2 Encode model requirements
  - 2.3.2.1 Build process model in commonly accepted modeling language
  - 2.3.2.2 Build information model in XML/PDML
- 2.3.3 Map process model to each participating site's processes and information model to PDML integration schema
- 2.3.4 Develop model functionality or modules
  - 2.3.4.1 Build neutral data presentation tool and DD Form 1693
    - 2.3.4.1.1 Map to analysis results/need for change data sources
    - 2.3.4.1.2 Map to Component engineer tool (PDM or other)
  - 2.3.4.2 Build DD Form 1692 in PDML
  - 2.3.4.3 Build DD Form 1692 internet transport capabilities (submit ECP pkg and update ECP pkg)
    - 2.3.4.3.1 Map to neutral interface to industry

# WBS 2.0 JECMM Development (3 of 3)

2.3.4.4 Build Notice of Revision (NOR) and selected Product Change Notices (PCN)

2.3.4.4.1 Map NOR to neutral interface to Logistics PMs

2.3.4.4.2 Map selected PCNs to Users/Warfighters, Component Engineering Authority, and Industry

2.3.5 Configure hardware and software and test model functionality

## **2.4 Develop Data Interoperability Templates**

2.4.1 Survey participant site computing environments

2.4.1.1 Define participating site data types

2.4.1.2 Define participating site information context

2.4.1.3 Define firewall and other system requirements

2.4.2 Map site data types to PDML integration schema

2.4.2.1 Build Application Transaction Sets (ATS)

2.4.2.2 Build XML style sheets

2.4.3 Register data interoperability templates at two or more commonly available XML registries

# WBS 3.0 Demonstration & Documentation

## **3.1 Plan and Document JECMM Pilot Demonstration**

- 3.1.1 Develop demonstration scenario
- 3.1.2 Develop demonstration test plan and document in final report
  - 3.1.2.1 Describe test cases
  - 3.1.2.2 Describe performance specifications/measures
- 3.1.3 Deploy configured hardware and software and data interoperability templates/ATs to participating sites
- 3.1.4 Conduct Beta pilot
- 3.1.5 Conduct interim demonstration at Logistics Community Forum 2001
- 3.1.6 Conduct final pilot at project conclusion

## **3.2 Document JECMM and Pilot Demonstration in Product Specification**

- 3.2.1 Document model architectures (Operational, System, and Technical)

## **3.3 Document Project Lessons Learned**

- 3.3.1 Assess and document model interfaces and wide spread adoption

# WBS 4.0 Validation Demonstration

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## **4.1 Plan and Document JECMM Validation Demonstration**

4.1.1 Assess Beta and interim demonstrations

4.1.2 Develop validation demonstration scenario

4.1.3 Develop validation demonstration test plan and document in final report

4.1.3.1 Describe test cases

4.1.3.2 Describe performance specifications/measures

4.1.4 Conduct validation demonstration

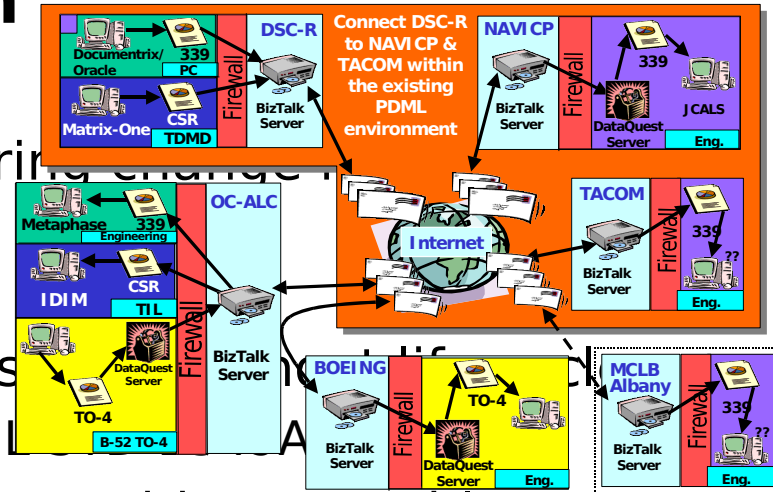
# JECMM Project Objectives

- **Follow PDML pilot approach**

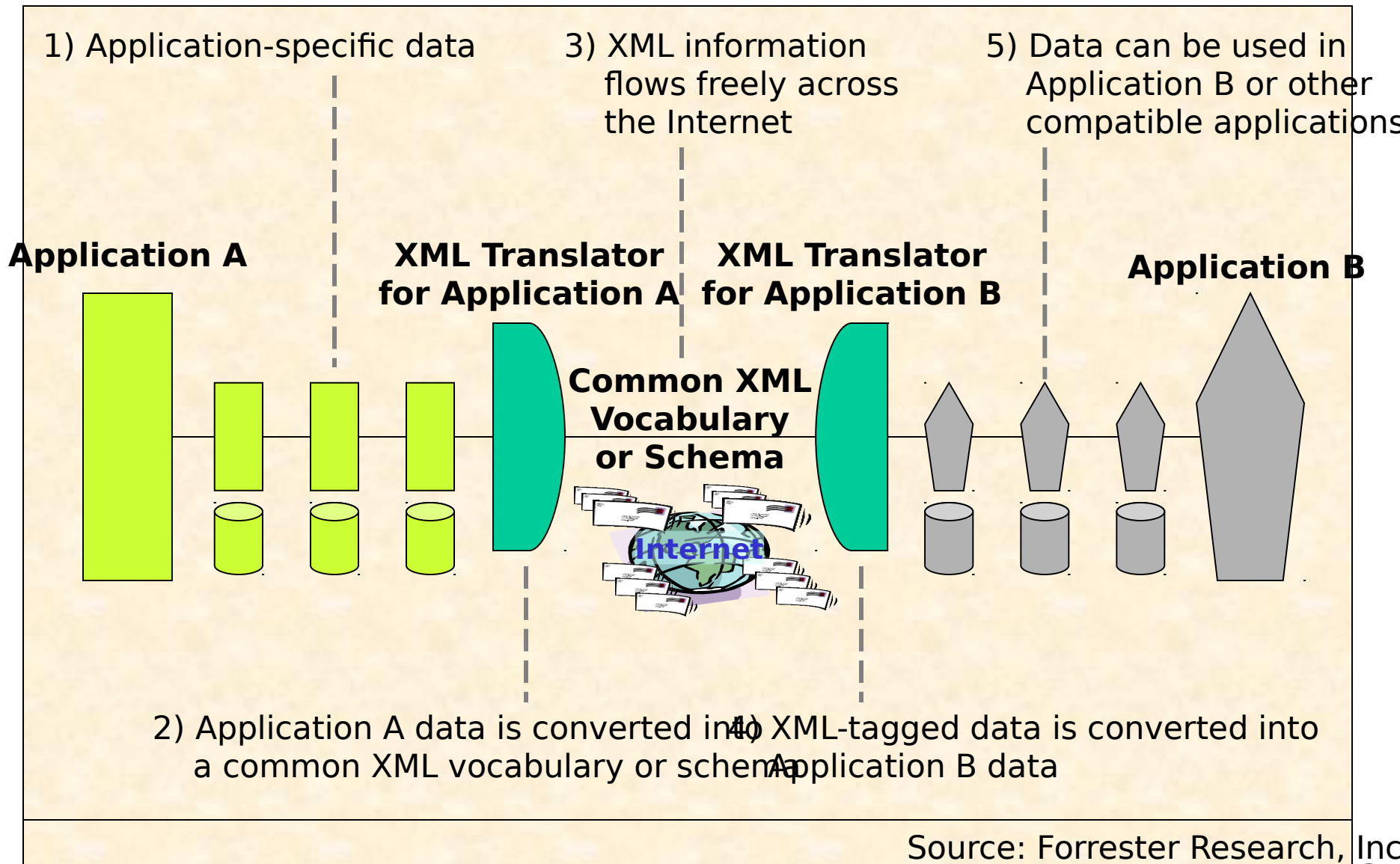
- Establish open, standards-based product data sharing of engineering change

- **JECMM Pilot Objectives:**

- Automate “standard” ECM process
  - Validate appropriate portions of MIL
- Develop ECM process in open format with exportable or common schema
  - Engineering change information is accessible and visible
- Pilot ECM process at each participating site
- Pilot data exchanges between participants using the Internet and COTS products



# How XML Works



# JECMM Implementation

- **Project Scope**

- Automate ECM process providing a common, standard informational context for managing and exchanging information in support of engineering change proposals, decisions, and notifications

- **Confirm participating sites and weapon systems**

- Related “community of interest” — User sites/support activities
- Acquisition Program(s)
- Industry partner(s) (OEM(s) with fielded systems as well)
- Engineering Support Activities in different Services
- DLA activity

- **Community of interest**

- Collection of DoD organizations that have a product (or group of products) in common
  - Has a need to share product information
  - Participate in a common business process, e.g., engineering changes

# JECMM Implementation (cont.)

- **Participants select approach to “standard” engineering change process**
  - Open “standards” and tools for establishing open environment, e.g., PDML, XML
  - COTS Product Data Management (PDM) software tools
- **Standards for interoperability**
  - Internationally accepted standards offer best chance for long-term interoperability
  - Standards need to support DoD’s Web-based system strategy
  - Common schema supports any interface and allows for unique “inside-the-fence” Service processes
  - Registered interoperability templates enable data exchange and integration between dissimilar sites and systems
  - Enable interoperability between different COTS tools (PDM and other)



# JECMM Implementation (cont.)

- **Participants select pilot implementation team**
  - Conducts ECM process re-engineering/automation
    - Visit sites to document ECM processes
    - Analyze site processes to determine commonalties
  - Develops open, interoperable environment, JECMM, and PDM tools at participating sites
    - Apply approved standards for interoperability based on ECM process analysis
    - Build common ECM integration schema
    - Build interoperability templates
  - Installs required software and hardware at participating sites
  - Conducts pilots
    - Exchange product data for engineering changes
- **Project objectives, roles, and responsibilities captured in JECMM IPT Charter**

# JECMM IPT Charter Outline

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- **A joint IPT including representatives from the participating sites/organizations as well as subject matter experts from various activities**
- **Will develop specific project requirements and provide technical oversight of the project. A charter will be developed for LIRRC approval describing the scope, roles and objectives of the IPT**
- **At its discretion, the LIRRC will approve an Independent Verification and Validation (IV&V) contractor or government agent to oversee the JECMM validation**

# Project Oversight

- **LIRRC Oversight**

- LIRRC approve JECMM IPT to oversee technical details of pilot project
  - Project participants + Component SMEs not related to pilot sites
  - Review technical concept and requirement -- ECM process and formats
  - Participate in IPRs
  - Authority to recommend project changes to LIRRC
- LIRRC select Independent Verification and Validation (IV&V) authority of pilot

# **FY 00 DII Project Initial Discriminators**

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- **DII COE**
- **JCALs Mission Area**

**Added by JFRC 6 Jan 99**

- **Relates to other Joint/DII funded projects**
- **Applies/extends funded initiatives**
- **Supports broad community/corporate goals**
- **Compliant/supports C4ISR/JTA**